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CONFERENCES AND CONGRESSES.*

IT is admittedly possible to have too much of a good thing.

Have we had too many International Meteorological meetings?

Have the results equalled the expectations of all concerned?

Has Meteorology been advanced proportionately to the sums expended in travelling and other accessories?

We yield to none in our appreciation of the advantages of the freest intercourse between the leading Meteorlogists of all countries. Whatever may be the verdict as to the public benefit arising from the extensive migrations which have lately been so fashionable, there can be no doubt that they must have considerably enlarged the views of those who have participated in them—although probably not to the extent which would have been the case had the delegates not cut themselves out thrice the work which could be properly accomplished. Still, as we have already said, the intercourse of the leading men of both hemispheres, must have been beneficial to all.

The personal benefit of the directors is of course a distinct national advantage, because the more able the director, the better the work which the nation who pays for it will obtain from him and from his office. Here, then, without further preface, we come upon a fact which must be held as in part an affirmative answer to our third question.

It is impossible to give categorical replies to the questions with which this article commences—at any rate, we cannot give them. We can only record our wish that all who take an interest in the question would buy these blue books and study them for themselves. We have

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* *Report on Weather Telegraphy and Storm Warnings.* Presented to the Meteorological Congress at Vienna, by a Committee appointed at the Leipzig Conference. Published by order of the Meteorological Committee. London: 8vo. Stanford, 1874.

Bericht über Wetter-Telegraphie und Sturmwarnungen, &c. [The German edition of the above.] Redigirt von Dr. G. v. BOGUSLAWSKI. Berlin: 8vo. Mittler u. Sohn, 1874.

Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. Published by order of the Meteorological Committee. London: 8vo. Stanford, 1875.

Report of the Permanent Committee of the First International Meteorological Congress at Vienna for the year 1874. Published by order of the Meteorological Committee. London: 8vo. Stanford, 1875.

done so with the strongest desire to be convinced that the combined skill of all the able men who have devoted their time to these meetings has succeeded in giving to Meteorology an impulse proportional to their efforts; but at present we must confess that we are waiting to be convinced. The refrain throughout seems to be—improve your stations, start many new ones, publish masses of statistics. Surely there is something higher, nobler, and more useful—though less glittering—than this! Has no one a word to say for a combined attack on the great problems of Meteorology, for ascertaining what we do know and what we do not know, and discussing existing data, instead of "adding millions of useless observations to the millions which already exist." We had perhaps, in order to avoid misconception, better here state distinctly that we are far from denying the utility of either establishing new stations or publishing the results; on the contrary, we approve of both; but we protest against work such as this being regarded as the aim and end of official meteorology. It is work which requires but a modicum of brains, and which is essentially adapted for the junior assistants of the various offices. We trust that in future conferences higher class work will be discussed.

We find no fault with the rules suggested, in the works now before us. We do not notice anything seriously wrong, but we do regret to see nineteen-twentieths of the thought of the conferences devoted to the observational, and but one-twentieth to what may be called the thinking power in Meteorology. Of course we shall be told that we are mistaken, that this article is unduly severe, that none but perfect observations are worth working up, and that therefore it is a necessary pre-requisite to establish good and uniform stations. Suppose it were so—the first conference met in 1872, we are now near the middle of 1875, are the stations yet in operation, and the instruments, &c., identical? And even if this question can be answered in the affirmative, we are not much more forward, for we must follow it by asking what steps have been taken by those entrusted with national resources to attack the difficult problems of Meteorology? such as have been attacked by private or semi-private observers. We need only mention the names of Loomis, Ley, Buchan, Blandford, and Hildebrandsson to indicate to thinking men the class of work which appears to us to have been almost ignored by the delegates and correspondents of the Conferences. The various meetings which have been held have been generally confined to gentlemen holding Government appointments, to the Directors of various national systems, and the works before us report their proceedings. We are sorry to see that men of such great ability—as many of them are—have spent their time upon discussing points upon many of which we cannot understand there being two opinions, and upon others which a good optician could have decided in half-a-minute.

Happily for themselves, nearly all the delegates are known for work of high quality. We have, therefore, confidence in the future, in spite of the depressing influence which, rightly or wrongly, the reports have exercised upon ourselves.

THE ROYAL OBSERVATORY, GREENWICH.

THE return of "Visitation-day," and the publication of the annual report of the Astronomer-Royal, render appropriate a few words respecting this national establishment, or rather one portion of it, for it is, and always has been, essentially and primarily an astronomical establishment, and with the astronomical arrangements we are here not concerned. We therefore select those matters which relate to meteorology. Under the head of Library we find the two following paragraphs:—

"The number of books has been considerably increased by presents from foreign countries; partly, I think, in consequence of the facilities now given by foreign book post; partly from the enormous activity in the publication of unreduced meteorological observations in the utmost detail. I doubt whether the value of the library is much increased by the works last mentioned."

"It seems doubtful whether the mass of unbound pamphlets is worth preservation."

We are very glad to find that the views urged in the first article in this magazine have evidently the support of Sir George Airy; in fact, he goes further than we do. We do not question the utility of printing observations *in extenso*, but we do lament the rarity of high-class brain work.

We trust that the Astronomer Royal will not allow the "mass of unbound pamphlets" to be destroyed without submitting them to scrutiny. If the Observatory Library does not need them, let them be sorted into heaps, astronomical, meteorological, &c., and forwarded to the societies for their scrutiny; but never let it be said that England has treated the mass as waste paper. If they are to be sold, there are many scientific men who would be glad to preserve them from being re-converted into pulp, which will probably be their destiny if sent to H.M. Stationery Office.

"It will be remembered by the Visitors that an extensive reduction of the Photographic Meteorological Records from 1848 to 1868 was commenced a few years ago. Among the infinite number of ways in which the different phenomena of meteorology may be combined, I selected for present examination the hourly photographic readings of the Dry and Wet Thermometers, arranged to exhibit diurnal inequality of those two instruments; as grouped by months, as grouped by high and low temperatures, as grouped by high and low barometer, as grouped by clear and cloudy skies, and as grouped by directions of the wind. This work is completed, and the abstracts for press are only waiting my examination. To this was added a deduction of the diurnal inequalities of the barometer from the hourly photographic readings from 1854 to 1873; this work is about half done. A limited discussion of the readings of the deep-sunk thermometers from 1846 to 1873 is completed."

The importance of this reduction cannot be denied. Although the Greenwich thermograph was the first that was made, we believe that no subsequent one is better. This may seem a harsh statement, but we think that it is very objectionable to have (as is now the fashion) the thermograph bulbs within 1 ft. or 1 ft. 6 in. of a brick or stone wall.

Mr. Glaisher having resigned at the end of the year 1874, Mr. Ellis was appointed Superintendent of the Magnetical and Meteorological Department, Mr. Nash remaining as Assistant.

The report concludes with an interesting survey of the work of the Observatory during the forty years that it has been under the direction of Sir George Airy, from which we must make a few extracts.

"The Report which I have now read is the fortieth of its class which I have had the honor to lay before the Board of Visitors. During the time to which they apply, the constitution of the Observatory, personal and material, has been greatly changed. Only one Member of the Board of Visitors, I believe, remains as witness of my first proceedings. There is not now a single Assistant, or a single instrument in use (for even Shuckburgh's Equatoreal is not employed as a graduated instrument) of those which formed the Establishment of 1835. The contemplation of this long period and of these changes induces me to look both backward and forward on the objects of the Observatory and the mode of carrying them out."

"The subject of Meteorology, which has been followed for many years, is scarcely connected with the two great heads of Astronomy and Navigation, and hardly deserves the name of a science. It is, however, in great popular request.

"Mechanical self-registration of some meteorological phænomena was introduced by me shortly after the commencement of my residence."

"Turning now from the past to the future, I see little in which I could suggest any change. If it should ever be necessary to make any reduction, I should propose to withdraw Meteorology, Photoheliography, and Spectroscopy; not as unimportant in themselves, or as ill-fitted to the discipline of the Observatory, but as the least connected with the fundamental idea of our establishment. In the nature of addition, I will indicate one practical point. I much desire to see the system of time-signals extended, by clocks or daily signals, to various parts of our great cities and our dockyards, and above all by hourly signals on the Start Point, which I believe would be the greatest of all benefits to nautical chronometry.

"Should any extension of our scientific work ever be contemplated, I would remark that the Observatory is not the place for new physical investigations. It is well adapted for following out any which, originating with private investigators, have been reduced to laws susceptible of verification by daily observation.

"The National Observatory will, I trust, always remain on the site where it was first planted, and which early acquired the name of 'Flamsteed Hill.' There are some inconveniences in the position, arising principally from the limited extent of the hill, but they are, in my opinion, very far overbalanced by its advantages."

Although we have always recognized the subordinate position of meteorology at the Royal Observatory, and consider the arrangements faulty in many respects, we should extremely regret the interruption of the existing series of eye observations. They are far from perfect, but they are unequalled as regards questions of secular change. One youth, as observer and computer, would be easily able to continue the eye observations, which we hold should never be altered or abandoned. We should be sorry to see the Meteorological Department reduced, and protest in the strongest terms against its ever being annihilated.

ON THE TEMPERATURE OF THE WINTER OF 1874-75.

By M. E. QUETELET.

[Translated from the *Bulletin de l'Académie Royale de Belgique, Avril*, 1875.]

THE past winter has presented some peculiarities worthy of brief notice. The mean temperature of September and October, 1874, were

about 2° above the average; November, on the other hand, was rather cool, December was very cold, January, on the contrary, was hot, February very cold, March rather so. The minimum of the winter, 8°·8, occurred on December 30th, and had been preceded by twelve days of uninterrupted frost; two days after this severe cold came suddenly the thaw, which was followed by the long warm period during January. In the forty years records of Brussels Observatory there is only one winter (1859-60) which presents the succession, December very cold, January very hot, February very cold. In order to compare readily the march of temperature during these two winters, I give in the following table the mean monthly temperatures for the two years, and append thereto the mean values given by our forty year series:—

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May
Winter of 1859-60	58·8	53·6	40·5	33·1	40·3	33·3	39·2	45·0	57·2
,, ,, 1874-75	60·1	52·7	40·6	32·5	40·5	32·7	39·2	—	—
Average 40 years	58·3	50·7	42·3	37·6	35·6	38·1	41·4	48·2	55·6

The agreement of the monthly mean temperatures during the two winters (October to March) is remarkable. One might be tempted to think that this agreement may continue, but we must not forget that the parallelism fails as regards pressure, rain, &c., and therefore we must not regard the seasons as directly comparable. However that may be, if the agreement in temperature continues, we shall have a rather colder April and warmer May than usual.

GREAT VARIATION OF SHADE TEMPERATURE, APRIL 21ST.

To the Editor of the Meteorological Magazine.

SIR,—When I made the observation about the sudden change of wind on the 21st April, I might have added a few particulars which would have helped to support the observations of others. The 19th and 20th were fine warm days, the maximum temperatures being 70° and 72°; the mimima were low, 32° and 37°. The morning of the 21st was very fine; at 9 a.m. the dry bulb thermometer was 63°, the wet bulb 54°; between twelve and one o'clock 65° was reached, the wind blowing very lightly from the west. I did not observe any change in the direction until 3 p.m., when I was suddenly surprised by a great rushing noise in the N.E., something like the herald of a heavy hailstorm. The change was, I may say, immediate from comparative calm to a rough high wind, and with the wind came the cold. During the night of the 21st the thermometer fell to 36°, and on the 22nd 46° was the maximum, and at 9 a.m. on the 22nd the thermometer stood at 39°, or 26° lower than on the previous day.

I am, Sir, yours obediently,

JOHN MATHISON.

Addington, 18th May, 1875.

To the Editor of the Meteorological Magazine.

SIR,—It has occurred to me that the following few particulars of the memorable 21st April may be interesting to you. 21st April, brilliant and clear till noon, cloudy after; very slight drizzling rain at times after 3 p.m. Max. temperature (of the day and month) 64° at noon, min. temperature 32° (early a.m.)

	Dry Bulb		Wet Bulb
At 10.0 a.m.	61·6	...	51·1
,, noon	64·0	...	52·0
,, 0.30 p.m.	57·0	...	49·0
,, 1. 0 p.m.	54·0	...	50·0
,, 2. 0 p.m.	43·8	...	41·3
,, 3. 0 p.m.	41·0	...	41·0
,, 6. 0 p.m.	38·0	...	38·0
,, 8. 0 p.m.	36·0	...	—
,,10. 0 p.m.	34·0	...	33·0

Wind S.E. in the morning, brisk from 10 a.m. to noon; N. strong till 8 p.m., then grew calm. No appreciable rainfall.

I am, Sir, your obedient servant,

F. R. HAWKES-MASON.

White House, Wereham, Brandon, 7th June, 1875.

SUPPLEMENTARY TABLE OF RAINFALL IN MAY, 1875.

[For the Counties, Divisions, Latitudes, and Longitudes of these Stations, see Met. Mag., Vol. X., p. 28.]

Station.	Total Rain.	Station.	Total Rain.
	in.		in.
Acol	1·78	Gainford	1·06
Hailsham	·59	Shap	2·71
Strathfield Turgiss	1·44	Llanfrechfa	4·05
Addington	2·36	Castle Malgwyn	2·50
Oxford	1·77	Heyope	2·76
Cambridge	1·98	Melrose	1·55
Sheering	1·47	Cessnock, Glasgow	1·14
Ipswich	3·38	Gruinart	2·30
Diss	2·18	Keith	1·44
Swaffham	1·13	Strathconan	3·44
Compton Bassett	3·04	Springfield, Tain	1·15
Hessary Tor, Dartmoor..	5·28	Skibbereen	3·02
Teignmouth	2·55	Fermoy	2·92
Torrington	3·14	Kilrush	1·91
Trevarrick, St. Austell..	3·19	Kilkenny	1·52
Taunton	2·57	Kilsallaghan	1·72
Cheadle	1·63	Twyford, Athlone	2·36
Ashby de la Zouch	2·02	Ballinasloe	...
Coston, Melton Mowbray	1·22	Kylemore	6·00
Bucknall	1·37	Bangor	4·11
Mansfield	1·52	Carrick on Shannon	2·82
Walton, near Liverpool..	2·21	Warrenpoint	2·15
Broughton-in-Furness ..	3·25	Bushmills	2·03
Stanley, Wakefield	1·41		

VAN RYSSELBERGHE'S METEOROGRAPH.

We learn from *L'Echo de l'Ostende* of May 30th, that at the meeting of the Royal Academy of Belgium, on May 11th, Prof. Van Ryssel-berghe exhibited the complete Meteorograph which is to be erected at Ostend. It is said to have been constructed with "rare precision" by Schubart, of Gand, and it engraves on a single plate the curves of (1) Mecurial barometer, (2 and 3) dry and wet bulb thermometers, (4) hair hygrometer, (5 and 6) wind's direction and force, (7) rain gauge, (8) tide gauge. The last will, we understand, be at some distance from the rest of the apparatus.

CUCKOO FIRST HEARD AT LINTON PARK ON THE DAYS MENTIONED BELOW.

1854	April 15	1860	April 27	1866	April 11	1871	April 10
1855	,, 18	1861	,, 20	1867	,, 18	1872	,, 12
1856	no record	1862	no record	1868	,, 21	1873	,, 13
1857	April 17	1863	April 13	1869	,, 10	1874	,, 20
1858	,, 15	1864	,, 16	1870	,, 16	1875	,, 15
1859	,, 19	1865	,, 11				

J. Robson.

REVIEWS.

The Meteorology of Sussex. By F. E. Sawyer. 8vo., 54 pages. [Reprint of a series of articles from the *Brighton Herald.*]

This is a capital little pamphlet, which contains an unequalled store of Meteorological data respecting the county, very systematically arranged and pleasantly written. The articles seem almost to justify the author's rather strong statement—"they present in a collected form all that has been written or observed respecting the climate of this county up to the present time." Of course Mr. Sawyer meant to write in a collected [and abridged] form, and, thus altered, the paragraph is almost correct. The collection of notes and records is remarkably good, and the gossiping bibliography at the end of the work is very useful. We may as well give the author another title to add to his list. *Eastbourne, and the advantages which it possesses as a resort for Invalids:* by W. Abbotts Smith, M.D., and C. C. Hayman, M.D. London, Stanford, 1861, post 8vo.

Climatologie de la ville de Fécamp, ou résumé général des observations météorologiques faites en cette ville de 1863 *à* 1872, Par. E. Marchand, Pharmacien, &c. Le Havre: Lepelletier, 1874. 8vo.

(*Continued from page* 58.)

M. Marchand has worked up his results in praiseworthy detail, and among other data gives the mean temperature of every day in the year. And not only so, but he gives the similar values for Paris (as

published by Marie-Davy) and for Lyons. We must, of course, refer our readers to the work itself for the complete tables, but we give the values for the first fortnight in May, adding those for Greenwich :—

	Mean temperature of each day from May 1st to 16th.				Departures from normal mean daily temperature.			
	Fécamp, 1853-72.	Lyons, 1851-65.	Paris, 1806-70.	Greenwich 1814-63.	Fécamp.	Lyons.	Paris.	Greenwich
1	50·0	53·6	53·8	50·1	— ·1	— ·9	— ·6	+ ·3
2	49·8	54·7	55·0	51·1	— ·5	— ·2	+ ·4	+1·1
3	51·1	56·7	56·1	50·5	+ ·6	+1·5	+1·3	+ ·3
4	50·2	55·6	55·9	51·2	— ·5	·0	+ ·8	+ ·7
5	50·4	54·7	55·6	51·5	— ·4	—1·3	+ ·3	+ ·8
6	51·4	54·7	55·8	51·6	+ ·4	—1·7	+ ·3	+ ·7
7	52·2	57·0	56·8	51·9	+1·0	+ ·3	+1·1	+ ·8
8	51·3	58·8	56·7	51·6	— ·1	+1·7	+ ·7	+ ·3
9	51·1	58·6	56·5	50·8	— ·5	+1·1	+ ·3	— ·7
10	52·3	59·2	56·1	50·8	+ ·5	+1·3	— ·4	— ·9
11	52·7	59·9	56·7	51·6	+ ·7	+1·6	·0	— ·3
12	51·8	57·9	56·5	51·4	— ·3	— ·8	— ·4	— ·8
13	51·8	58·8	56·1	51·2	— ·5	— ·3	—1·1	—1·2
14	52·7	58·8	55·9	50·9	+ ·2	— ·7	—1·5	—1·7
15	52·9	60·3	56·5	52·3	+ ·2	+ ·4	—1·1	— ·5
16	52·5	58·3	57·0	53·5	— ·4	—1·9	— ·8	+ ·5
17	53·8	60·1	58·3	54·0	+ ·7	— ·5	+ ·3	+ ·8

We are not prepared to defend the absolute accuracy of the method we have adopted for determining the departures, but we believe it, though intricate, to be correct, and it certainly brings out the feature which we wished to illustrate—namely, the low temperature May 9th to 15th. If our calculations are correct, the departure table proves that the deficiency is felt first at Greenwich where it becomes greatest, that it occurs one day later at Paris, and three days later at Fécamp and Lyons, but at neither of these is it so marked as at the first two.

Respecting the rainfall, M. Marchand gives the total yeraly fall, which (converted) is as follows :—

	in.		in.
1853.....	31·61	1863.....	27·68
1854.....	29·60	1864.....	24·07
1855.....	27·23	1865.....	31·80
1856.....	30·03	1866.....	38·89
1857..... ..	29·08	1867.....	36·85
1858..... ...	30·89	1868.....	27·93
1859.....	39·63	1869.....	32·21
1860.....	45·79	1870.....	30·53
1861.....	26·36	1871.....	28·40
1862.....	30·88	1872.....	43·60
Mean...	32·11	Mean ..	32·20

Upon this table M. Marchand very justly remarks that in the first place it must not be assumed that the singularly close agreement between the mean rainfall in the two decades implies that that impor-

tant element necessarily lies between those values, and he proves this by showing that the mean of the ten years 1862-71 was only 30·93 in., whereas that of the decade 1858-67 was 33·28 in. In earlier parts of the work M. Marchand has shown that the second decade was warmer, the wind more southerly and stronger than the first; he therefore compares the seasonal distribution of rain, and finds the following marked difference:—

	First Period.	Second Period	Difference.
Spring.... ...	6·93 in. ...	6·46 in. ...	—0·47 in.
Summer	7·64 ...	6·54 ...	—1·10
Autumn	10·71 ...	10·91 ...	+ ·20
Winter	6·85 ...	8·31 ...	+1·46

The following remarks as to a question of periodicity may be worthy of extraction:—

"I have in my first memoir called attention to the inundations of 1824, 1842, and 1860, as appearing to indicate a return of these disastrous phenomena at the expiration of each period of 18 years. The future will demonstrate the value of this remark. I think, however, that I ought to mention here a 17th century fact, which within a trifle agrees with the above rule. According to a petition signed by a M. Corbière, and by a M. Le Huillier, curé de St. Fromond, 'on the 18th of September, 1679, the waters inundated the houses to a depth of from 4 to 5 feet, they destroyed the merchandize, and washed away the gardens and placed many persons in peril of their lives.' According to another account the inundation occurred on a Sunday, during service in the church of St. Fromond; the office had to be suspended, and the faithful hastened from the edifice for safety. This church was situated on the steep land between Rue du Bail and Rue Jaques Huet, and near the right bank of the large Rue de l'Inondation, which was opened in 1848 to prevent the recurrence of such disasters as occurred in 1824 and 1842.

Ah, well! between 1679 and 1824, each of which were characterized by great accumulations of water in the Place du Bail, there elapsed almost exactly eight periods of 18 years each. This fact is worthy of notice."

This subject certainly requires further evidence; but before leaving it we are tempted to place at M. Marchand's service the title of an English book which would interest him, "*A cycle of eighteen years in the seasons of Britain, deduced from Meteorological observations*, 1824-1841, by Luke Howard., F.R.S.; 8vo., Ridgway, London, 1842."

One of the quaintest ideas in M. Marchand's work, and almost the only one which we cannot yet accept, is that electric phenomena, hail, storms, and rain are excessively frequent during the week which has Ascension Day for its middle day. This leads the author to discuss the influence of the moon on the weather. Into this desperate subject we shall not plunge, the importance of the differences which he has proved seems to us very slight, for instance that between the mean daily temperature of two quarters* is 0°·007 F. It is somewhat more appreciable between the syzigies, but even then it only just exceeds 0°·1 F., and is therefore in both cases quite imperceptible to the feelings, and of no practical importance.

Before quitting this work, we must pay tribute of the highest praise

* Or rather two halves, for M. Marchand divides the lunation into (1) From the last quarter to the first quarter (moon dark), and (2) From the first quarter to the last (moon light).

to M. Marchand for his great care in reading the proofs We know a little of the rarity of accurately-printed tables, and of the care requisite to secure even moderate success; but though M. Marchand's book is crammed with closely-printed tables, many of which we have checked, we have at present only detected a single misprint—viz. on p. 34, in the last line of the last column of the table, 32°·4 should be 32°·7.

Report of the Kew Committee for the year ending October 31st, 1874.

THANKS to Mr. Gassiot's princely liberality this establishment is efficiently maintained, and the above report shows that somewhat more than the average amount of work has been accomplished during the year. Two special sets of experiments are mentioned, but as the results are not even indicated we suppose we must wait for their appearance in some other form. The paragraphs to which we refer are the following:

"The daily record of temperature from thermometers at different elevations on the Pagoda, in the Royal Gardens, Kew, at the expense of the Meteorological Committee, was continued up to August, when it was interrupted, to be resumed during the winter months."

"In the last report mention was made of certain experiments in progress, with respect to the testing of Anemometers. A piece of ground having been rented in the Park was not nearly sufficiently open to afford facilities for testing the instruments at any but very low velocities, and not very satisfactorily even in such cases. Application was therefore made to the Secretary of the Crystal Palace Company for permission to employ a rotary machine driven by steam power, so as to be able to vary the velocities at pleasure. Consent having been most freely given, the experiments were commenced, and the instruments tested at various velocities up to about 30 miles an hour, the highest attainable by the apparatus. The investigations were interrupted during the summer, and will be resumed on a future occasion. It is hoped that by this method of artificial rotation, which was that employed by Smeaton in his experiments on windmill sails, more satisfactory results will be attained than it is otherwise possible to get. The expense of the experiments has been defrayed by a vote of the Government Grant Fund."

Repertorium für Meteorologie herausgegeben von der Kaiserlichen Akademie der Wissenchaften redigirt von DR. H. WILD. Band IV., Heft 1., 4to. St. Petersburgh, 1874.

THIS part contains the following six papers:—

(1). WILD, H. Additional Supplement to the Instructions for Meteorological Stations.
(2). MIELBERG, J. Magnetic Declination at St. Petersburgh.
(3). FRITSCHE, H. Geographical, Magnetical and Hypsometric Observations at 59 Stations on the route from Pekin, through Eastern Mongolia, Nertschinsk, Irkutzk, Barnaul, Ekaterinburg and Perm to St. Petersburgh.
(4). KOPPEN, Dr. On the dependence of the Climatic character of the Winds on their origin.
(5). DOHRANT, F. On the estimation of Anemometer Constants.
(6). RIKATCHEFF, M. The distribution of Atmospheric pressure in European Russia.

We select the last, for notice on the present occasion, as probably of most general interest, but that of M. Dohrant is also well worthy of consideration.

M. Rikatcheff's paper is the best of its class that has appeared for many years. It immediately challenges comparison with Mr. Buchan's paper in the *Trans. Roy. Soc.*, Edinburgh, and surpasses it in accuracy as much as Mr. Buchan's does M. Rikatcheff's in extent, and number of stations. This comparison would naturally occur to any one conversant with the subject, but it is especially forced upon our notice by the rather severe manner in which M. Rikatcheff deals with Mr. Buchan's tables respecting the barometric pressure in Russia. Most likely Mr. Buchan's figures are not right, but M. Rikatcheff seems to overlook the difficulty which all but Russians would have in ascertaining with precision the facts of each case, and to forget entirely that his intimate acquaintance therewith is largely due to the special facilities which his appointment gives him.

After a comparatively brief introduction, M. Rikatcheff proceeds to give interesting and useful data respecting each station, and then he inserts a table of mean annual pressure at about 60 stations. These values are the basis of his yearly mean isobarometric chart, in reference to the formation of which M. Rikatcheff truly suggests that the most exact mode of constructing such a chart, would be to compute by the method of least squares the co-efficients depending on the latitude and longitude, and thence the place of each isobar. He, however, rightly points out that at present the observations are neither sufficiently accurate, nor made at stations sufficiently close together to render the adoption of this plan advisable. Of the Russian stations the lowest mean (seven years) annual pressure is 29·796 in. at Kem, in lat. 64°57′ N. and lon. 34°39′ E., and the greatest is 30·071 in. at Orenbourg, in lat. 51°49′ N. and lon. 55°6′ E.

This table is followed by data respecting other stations, and the mode by which the returns of stations in the first table are used for checking and completing those in the subsequent ones.

The tables of mean monthly pressure appear to be carefully worked out, and are followed by remarks upon them, and upon the monthly isobaric charts drawn from them. Finally the memoir ends with the following summary.

(1) We require particularly the altitude of the stations of Bogoslowski, Catherinebourg, Zlatooust, and Lougan, and barometric observations for at least ten years at many stations in N., E. and central Russia, but their precise altitude must be determined.

(2) The isobaric charts are probably true to 0·040 in. in Eastern, and to 0·010 in. in Western Russia.

(3) The distribution of temperature and of vapour in the various months of the year, explains the high atmospheric pressure in Asia during the winter and its displacement towards the Atlantic in summer.

(4) Although these general causes are inadequate to explain the small barometric pressure in the N. of Europe, where the pressure of dry air is greater than in the hot southern countries, we have thought that it may be explained by the squalls and cyclones which, formed over

the gulf stream and on the W. of Europe, travel northeastward. As to the minimum which we notice at Christiansund we attribute it to the great quantity of rain which falls in that part of Norway.

(5) The contours of the continent and the mountains appear also to exercise an influence over the configuration of the isobars.

Essai sur les courants supérieurs de l'Atmosphère dans leur relation aux lignes isobarométriques. Par H. HILDEBRAND HILDEBRANDSSON (Présenté à la Société Royale des Sciences de Upsal, le 28 Novembre, 1874.) Upsal: Berling, 1875. Folio.

THIS is a first attempt at determining the motion of the upper currents of the atmosphere by comparing records of the direction of the motion of those clouds (the cirri) which are known to prevail solely at great altitudes. M. Hildebrandsson has organized a small body of observers, and in the above work represents their observations on a series of charts. As far as we are able to judge, he appears to have evidence in favour of the views of the circulation of the upper currents, which he has enunciated, but we shall be glad to see further proof. We do not understand why the charts are not for consecutive days, and we think that in his next paper the author should chart each consecutive day for say one month.

It is also most desirable that he should obtain a wider spread staff of observers. One each in Spain, Italy, the Crimea, Northern Russia, Ireland, and at the top of the Gulf of Bothnia, are indispensable. If no Irish observer will volunteer, surely one Englishman, or a Scotchman, will come forward. By using Goddard's cloud mirror, the observation is both easy and interesting, while extreme punctuality is not important. Perhaps General Myers will add it to the elements observed by his staff—if so, the question could be determined in a few months.

ON VARIATIONS IN THE FREQUENCY OF THUNDERSTORMS.

A STATISTICAL investigation on the subject of thunderstorms, was not long since made by M. von Bezold, of the Munich Academy, on the basis of data furnished by fire insurance companies, as to the production of fires by lightning in the Kingdom of Bavaria. It appeared from this enquiry, beyond a doubt, that there were both differences as to space, and time periods, in the occurrence of the phenomena; M. von Bezold, therefore, was determined to prosecute the subject further, and work out the data of observation of the larger meteorological observatories, taking as long a period as possible. Unfortunately the available material was very defective, for very often no attention was paid to thunderstorms among the meteorological phenomena at the stations; on the other hand, sometimes only the days of the storm were noted, sometimes only the individual storms, sometimes only the thunder, sometimes each flash of lightning was recorded. Nevertheless, M. von Bezold found himself in a position to form tables of the comparative numbers and the means, for the year 1764 to 1867, which showed a series of regular varieties of the thunderstorms. While, as the author points out, the material is not quite trustworthy for the whole of the period men-

tioned, and gains in authority as we come nearer the present—the stations being numerous, and observations more exact—still the occurrence of minima at particular epochs is undeniable ; from these the frequency gradually increases, and then decreases to the next minimum.

The variations in frequency are made still more evident by the curve which M. von Bezold constructs from his numerical data, in which the years are taken as abscissæ, and the means of all observations as ordinates. In order to form an estimate as to the dependance of thunder-storms on other meteorological elements, the author compares this curve with the temperature curve for the same time, and with the curve of sun-spots, whose relation to many meteorological phenomena has of late excited so much interest. The temperature curve shows the divergences of the mean yearly temperature from the entire average for our latitudes, while the sun-spot curve is so constructed that the lowest parts correspond to the maxima of sun-spots. Now, on comparison of these three curves, it appears that the curve of thunderstorms takes a mean position between the temperature curve, which in general it follows, and the sun-spot curve, with which also it generally harmonises ; so that by combining the sun-spot curve and the temperature curve, a curve very like that of the thunder-storms is obtained. Hence the following conclusion, according to M. von Bezold, is rendered highly probable :—

"High tenperatures, as also a spotless condition of the sun's surface, produce years with abundant thunderstorms. Now, as the mutations of the sun-spots coincide with the greatest intensity of auroras, it follows that both groups of electric phenomena, thunderstorms and auroras, to some extent compensate each other ; so that years with abundant thunder-storms correspond to years with few auroras, and conversely.

"Such a connection between sun-spots and thunder-storms in no way requires us to suppose an immediate electric reciprocal action between the earth and the sun, but may be simply a result of the extent of insolation as conditioned by the covering of spots. These changes of insolation become perceptible in different latitudes (according to Koppen), not simultaneously, but successively. The phenomena of thunder-storms, on the other hand, depend not only on the conditions of temperature of the particular place, but also on the state of the atmosphere at far distant points belonging to another zone. In this way the peculiar middle position, which is taken by the curve of thunder-storms, between the spot and the temperature curve, may possibly one day be explained."—*English Mechanic.*

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MAY, 1875.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32°. In shade	On grass
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	1·61	— ·79	·41	28	13	78·3	14	39·8	31	0	0
II.		Maidstone (Linton Park)	1·38	— ·86	·41	28	8	82·0	15	40·0	31	0	0
,,		Selborne (The Wakes)	1·95	— ·53	·48	6	11	75·5	15	34·2	3	0	1
III.		Hitchen	2·00	+ ·07	·53	28	12	71·0	15	36·0	16	0	...
,,		Banbury	2·11	— ·11	·56	7	14	77·0	15	39·0	17‡	0	...
IV.		Bury St. Edmunds (Culford)	2·15	— ·01	·78	28	10	77·0	15	33·0	30	0	4
V.		Bridport	2·41	+ ·38	·52	6	13	73·0	14	34·0	11	0	..
,,		Barnstaple	2·61	+ ·17	·55	6	14	79·0	15	41·5	11	0	...
,,		Bodmin	3·09	+ ·63	·41	21	16	72·0	15	43·0	13	0	0
VI.		Cirencester	2·39	+ ·11	·34	6	11	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	1·15	— 1·11	·25	28	11	69·0	14	36·0	30	0	0
,,		Tenbury (Orleton)	2·56	— ·32	·69	28	13	78·3	14	36·2	23	0	0
VII.		Leicester (Belmont Villas)	1·80	...	·35	20	14	77·5	14	38·0	30	0	...
,,		Boston	1·05	— ·89	·26	20	12	81·0	14	37·0	30	0	...
,,		Grimsby (Killingholme)	1·55	...	·29	28	14	70·0	12*	39·0	17‡	0	...
,,		Derby	...	...	...	...	...	...	...	...	...	...	...
VIII.		Manchester	...	..	...	...	...	...	...	...	...	...	...
IX.		York	1·61	— ·34	·26	8	14	75·0	14	38·0	30	0	...
,,		Skipton (Arncliffe)	4·45	+ 1·10	·69	20	19	75·0	14	32·0	16	1	...
X.		North Shields	·72	— 1·92	·19	8	14	70·0	14	39·0	3	0	..
,,		Borrowdale (Seathwaite)	7·80	— 1·74	1·13	17	17	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)	...	..	...	..	...	...	...	...	...	...	...
,,		Haverfordwest	2·86	+ ·14	·59	19	12	73·0	14	41·0	30	0	...
,,		Rhayader (Cefnfaes)	...	...	...	...	...	...	...	...	...	...	...
,,		Llandudno	1·46	— ·92	·43	27	13	72·9	14	38·5	1	0	...
XII.	SCOTLAND.	Dumfries (Crichton Asylum)	1·73	— ·66	·30	6	18	68·8	6	35·8	19	0	0
,,		Hawick (Silverbut Hall)	1·36	...	·40	23	12	...	...	...	...	...	...
XIV.		Kilmarnock (Annanhill)	...	...	...	...	...	...	...	..	...	...	...
XV.		Castle Toward	3·05	— ·34	·62	22	18	66·0	5	...	...	...	...
XVI.		Leven (Nookton)	1·19	— ·81	·24	8	13	70·0	4	36·0	19	0	7
,,		Stirling (Deanston)	...	...	...	...	...	..	...	...	..	...	...
,,		Grandtully	1·58	...	·42	21	15	...	...	..	...	...	...
XVII.		Braemar	1·64	— ·16	·53	21	14	64·7	30	35·3	17	0	3
,,		Aberdeen	1·66	...	·60	27	16	73·8	14	38·8	24	0	1
XVIII		Loch Broom	4·17	...	·61	6	19	...	...	...	...	...	..
,,		Portree	6·83	+ 1·18	1·04	11	24	...	...	...	...	...	...
,,		Inverness (Culloden)	·86	— ·70	·20	25	11	65·4	7	38·2	6	0	0
XIX.		Helmsdale	1·94	...	·50	19	13	...	...	...	...	...	...
,,		Sandwick	1·51	— ·75	·46	28	17	...	...	...	...	...	...
XX.	IRELAND.	Caherciveen Darrynane Abbey	3·31	...	·85	20	15	...	...	...	...	...	...
,,		Cork	2·42	...	·50	6	9	...	...	...	...	...	...
,,		Waterford	2·61	+ ·36	·70	6	15	69·0	27†	41·0	30	0	...
,,		Killaloe	3·13	— ·05	·60	20	21	77·5	14	38·0	22	0	...
XXI.		Portarlington	1·74	— 1·46	·41	22	20	76·0	14	38·0	15	0	...
,,		Monkstown, Dublin	1·20	— ·71	·32	21	14	...	...	...	...	...	...
XXII.		Galway	3·68	...	1·25	20	21	70·0	14	38·0	19	0	...
,,		Ballyshannon	1·78	...	·51	11	14	...	...	...	...	...	...
XXIII		Waringstown	1·79	...	·30	10	19	75·5	15	34·0	16	0	4
,,		Edenfel (Omagh)	2·79	...	·83	21	20	66·0	14	35·0	18	0	0

* And 14, 15. † 25. ‡ 30.

+Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON MAY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LINTON.—A very dry, fine month, the middle portion especially being very warm for the season. T on the 19th and 28th; brisk, but not high, winds on 18th, 20th, 22nd, and 30th; H on 19th. Vegetation, which was very late at the beginning of the month, made great progress, so that at the end it was as forward as in the average of seasons, and most of the crops promise well.

SELBORNE.—A remarkably fine and dry month. Crops, both cereal and hay, and also hops, very promising. Frost on the grass on the 3rd; TS at 8 p.m. on 18th; H at 9 a.m. and TS at 1 p.m. on 19th; violent storm at Alton at 10 a.m. on 22nd; TS at noon on 28th; fall of R here ·33; at Petersfield the water in the streets was 2 feet deep. Prevailing winds—first half of month, S and S.W.; towards the close, N.E.

BANBURY.—TS and H at 4.20 p.m. on 18th; H at 1 p.m. on 19th; high wind 6th on 22nd.

CULFORD.—The grass about here was crisp with frost on the morning of the 31st. The mean temp. of the month 54°, which is in excess of that of the corresponding month of 1874. Easterly winds on 10 days, and westerly on 21 days. T with H occurred on the 19th and 28th.

BRIDPORT.—The refreshing showers this month have caused vegetation to advance rapidly, making up for lost time; an abundant hay harvest is anticipated. Heavy H with T on 19th.

HAUGHTON HALL, SHIFNAL.—This May has been remarkably free from frost, the ther. not having fallen to the freezing point, not even on the grass, on any night, though it fell within 1° of it on the 30th. Owing to the prevalence of N. and E. winds and the deficiency of R, the pastures were by no means forward at the close. The trees came early into leaf: the oak and ash by the 14th, and in the fullest leaf by the 29th; the hawthorn in great blossom by the 18th, and the hollies so beyond precedent; a prospect of a good supply of fruit of all sorts, apricots especially. Willow wrens first heard on 3rd; turtle dove on 6th; fly catcher first seen on 13th; mushrooms gathered in field on 10th.—*Erratum.* Total rainfall in March, ·82 —1.12.

ORLETON.—The first 11 days were generally cloudy but pleasant, with an even temp.; the air then became nearly cloudless, and remained very hot with brilliant sunshine till the 17th, when a distant TS occurred in the night, followed by light showers for several days; the remainder of the month was generally fine and pleasant, with a copious fall of R on 28th. The mean temp. of the month was nearly 2° above the average, and the progress of vegetation has been very rapid. The apple trees were generally in full blossom about the middle of the month. T was heard on 17th, 21st and 28th, and L seen on 17th and 28th.

LEICESTER.—The R which fell in the 1st and 3rd week, with the warm days between them, had a marvellous effect on vegetation. TS between 11 and 12 p.m. on 17th; T at 9 a.m. on 19th; fine rainbow at 7.20 p.m. on 22nd; scarcely any E. wind till last few days.

BOSTON.—The mean temp. 1°·7 below the average of the previous 11 years; the ther. very variable, ranging from 81° to 37°; R less than average; TS with heavy R on 20th. Lilac and laburnum in flower from the 11th to 13th, and the thorn about the 17th.

KILLINGHOLME, GRIMSBY.—A fine, warm month; late sown barley cannot grow for want of R; but the springs are higher than they were at the corresponding time last year. Great promise of a good fruit crop. House martins arrived on 2nd, white-throat on 5th, spotted fly-catcher on 9th, and swift on 19th. Horse-chesnut and lilac flowered on 8th, the hawthorn began to flower on 13th (it is unusually beautiful). Potato tops injured by frost on 17th; TS at 6.15 p.m. on 18th, Killingholme Lighthouse struck.

ARNCLIFFE.—Beautiful spring month; vegetation very forward.

SEATHWAITE.—T on 5th; H on 22nd; S on the hill tops on 16th; only five days on which more than half-an-inch of R fell, and only two on which 1 in. was registered.

WALES.

HAVERFORDWEST.—A very fine month; total absence of frost; grass and corn crops luxuriant; general appearance of the country better than for years past. Temp. cool throughout the month, with the exception of a remarkably hot period, 13th to 15th. From the 26th to the end the air was very cold, owing to the prevalence of a strong polar current. Whitethorn coming into blossom on the 27th; ash in leaf on 12th; oak on the 19th. Wind, W. and S.W. on 12 days, the remaining days from N.W., N., or E.N.E.

LLANDUDNO.—A dry month, notwithstanding which the crops generally are making satisfactory progress. Horse-chesnut in flower on 4th; hawthorn and laburnum on 7th; mountain ash on 10th, and wild rose, elder, and seringea on 27th. Landrail heard on 6th.

SCOTLAND.

DUMFRIES.—Mean temp. 51°·7, being 4° higher than last year; a good month for vegetation, the temp. never having fallen to the freezing point, although one half of the month was dry and cold from the prevalence of E. wind; the first half of the month was most genial and mild. Heavy H storm at 3.30 p.m. on 18th.

HAWICK.—T on the afternoon of the 23rd; H on 18th; very stormy on 21st. The month has been entirely free from frosts, and the garden fruits have set well. Apples, pears, cherries, apricots, gooseberries and currants betoken a good crop. Though the country is looking well, R is much wanted.

CASTLE TOWARD.—A most satisfactory month; the R which has fallen on 18 days has told favourably on all the crops; cereals making rapid progress; pastures looking well generally, but, hillward, the crop is late; the hay suffered from dry spring; rye grass is shooting into flower, and is short; turnip sowing is being pushed forward; potatoes look very well; fruit is nothing to what was expected from the blossom. On the 16th a fine hive of bees cast, considered very early.

BRAEMAR.—A month of fine weather, but somewhat dry. TS at 7 p.m. on 21st, and at 5.30 p.m. on the 22nd.

ABERDEEN.—Mean temp. 51°·7, or 3°·4 higher than the average for May during 18 years; R below the average; winds from W. and S.W. greatly in excess of the average. A remarkably fine, dry month, and without any frost. T at 5.30 p.m. on 8th, and in early morning of 9th; TS and heavy H at 5 p.m. on 18th.

LOCHBROOM.—Except that it was rather too wet for preparing the ground for turnips, the weather was all the farmer could desire, and the sheep farmers have found the lambing season quite to their satisfaction.

PORTREE.—A cold, wet month. Heavy H showers on 20th, 21st, 22nd and 23rd, with strong squalls.

IRELAND.

DARRYNANE ABBEY.—The wettest May for the last six years in quantity, though only about the average in the number of days. Wind variable, light to moderate. Crops progressing, and grass growing fast; a good month for the farmers.

WATERFORD.—Wind high on 21st, 22nd, and 23rd.

BALLYSHANNON.—This month has been a very fair one, though the temp. has been lower than that of April. Crops in this neighbourhood are looking well, and there has not been any damage to potatoes, either from frost or blight.

WARINGSTOWN.—Crops looking remarkably well, considering the dry weather.

OMAGH.—Weather of this month very favourable to vegetation, but owing to the prolonged drought of April, too late to thoroughly recover the hay crop. The rare fact of there having been no frost during the month causes the prospect of fruit to be unusually good.